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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,678	09/07/2006	Ulf Skarby	P18921-US1	8758

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EXAMINER	
DAGLAWI, AMAR A	

ART UNIT	PAPER NUMBER
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,678	SKARBY ET AL.	
	Examiner	Art Unit	
	Amar Daglawi	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/07/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/07/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 30 is objected to because of the following informalities: the limitation "plurality of frequency converters (55-58)" doesn't require the numbering from 55-58. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 17-32 are rejected under 35 U.S.C. 102(b) as being anticipated by MALMGREN (WO 99/26317).

With respect to claim 17, MALMGREN discloses a method for reducing the number of feeders between a radio base station and a receiver diversity antenna arrangement that comprises at least two spaced apart antennas each adapted for reception of individual RF signals, said RF signals all being at the same frequency (Abstract, Fig.3, page.1), said method comprising the steps of:

converting one or more received antenna signals into a corresponding number of intermediate frequency (IF) signals by mixing with a first set of a corresponding number of reference signals (Fig.3, page 3, lines 1-11) [the LNA receives RF

signals and amplifies then. The one or more IF stages mix the amplified signals with one or more local oscillations to convert the amplified RF signal into intermediate frequency signals]

forwarding the signals received on all the antennas, of which one or more have been frequency converted to the base station on a single feeder (Fig.3, page 3, lines 1-21, page.2, lines 15-26) [each base station is connected to ANI (antenna equipment indoor].

With respect to claim 18, MALMGREN further discloses converting all the received antenna signals except one and forwarding the non-converted antenna signal together with all the converted IF signals to the radio base station on the single feeder, thus providing n-way diversity with a single feeder (Fig.2, Fig.3, page 3, lines 1-21).

With respect to claim 19, MALMGREN further discloses the diversity antenna arrangement comprises n antennas, said method comprising the step of converting all received antenna signals and forwarding them to the radio base station on the single feeder, thus providing n-way diversity with a single feeder (Fig.3, Fig.2, page 3, lines 1-26).

With respect to claim 20, MALMGREN further teaches characterized by converting the IF signals to second IF frequencies by mixing them with a second set of reference signals in order to obtain a second set of IF signals which are forwarded to the base station on the single feeder (Fig.3, Fig.2, page 3, lines 1-26) [the LNA receives RF signals and amplifies then. The one or more IF stages

mix the amplified signals with one or more local oscillations to convert the amplified RF signals into intermediate frequency signals].

With respect to claim 21, MALMGREN further teaches converting the antenna signal on the second antenna into an IF signal and forwarding the IF signal together with the non-converted antenna signal on the first antenna to the radio base station on a single feeder, thus providing 2-way diversity with a single feeder (Fig.3, page.3, lines 1-21).

With respect to claim 22, MALMGREN further teaches converting the RF signals from the second and fourth antennas into first and second IF signals, both of the same intermediate frequency; forwarding the non-converted antenna signal on the first antenna together with the first IF signal on a first feeder to the base station; forwarding the non-converted antenna signal on the third antenna together with the second IF signal on a second feeder to the base station, thus providing 4-way diversity with two feeders (Fig.3, pages 3-5).

With respect to claim 23, MALMGREN further teaches converting, at the radio base station, the IF signals into other IF signals, all on the same intermediate frequency, by mixing them with a set of reference signals and subjecting the twice frequency converted signals on the common intermediate frequency to diversity signal processing (Fig.3, page.3, lines 1-21).

With respect to claim 24, MALMGREN discloses a receiver diversity arrangement (Fig.3) comprising:

At least two diversity antennas each adapted for reception of individual radio frequency (RF) signals, said RF signals all being at the same frequency (Fig.3, page 3,lines 1-11) [in a phased array antenna system it uses relative phase at the same frequency];

One or more frequency converters each adapted to convert a respective antenna signal to a respective intermediate frequency signal to a respective intermediate frequency signal (IF) by mixing it with a predetermined frequency (Fig.3, page 3, lines 1-11) [the LNA receives RF signals and amplifies then. The one or more IF stages mix the amplified signals with one or more local oscillations to convert the amplified RF signal into intermediate frequency signals];

A combiner for combing the signals received on all the antennas of which signals one or more have been frequency converted to form a composite signal which is forwarded to a radio base station on a single feeder (Fig.3, page 3, lines 1-30, Fig.2, page.2, lines 15-26) [each base station is connected to ANI (antenna equipment indoor].

With respect to claim 25, MALMGREN further teaches a signal from a diversity antenna follows a diversity branch characterized by providing a frequency converter in each diversity branch except for one (Fig.3, page 3, lines 1-31).

With respect to claim 26, MALMGREN further teaches a signal from a diversity antenna follows a diversity branch characterized by providing a frequency converter in each diversity branch (Fig.3, page 3, lines 1-31).

With respect to claim 27, MALMGREN further teaches a second set of frequency converters are adapted to convert the first set of IF signals into a second set of IF signals for transport to the radio base station on the single feeder (Fig.3, page 3, lines 1-26, Fig.2) [the LNA receives RF signals and amplifies then. The one or more IF stages mix the amplified signals with one or more local oscillations to convert the amplified RF signals into intermediate frequency signals].

With respect to claim 28, MALMGREN further teaches there are two diversity antennas, one of which is connected to a first duplex filter so as to provide for reception and transmitting characterized by a single frequency converter converting the antenna signal from the second antenna to an intermediate frequency to form an IF signal, the combiner combining the original RX signal from the first antenna with the IF signal into a composite signal, and a single feeder forwarding the composite signal to the base station, thus providing 2-way diversity with one feeder (Fig.3, page 3, 1-35, Fig.2, page 2, lines 15-26).

With respect to claim 29, MALMGREN further teaches a duplicate diversity antenna arrangement to provide a composite diversity antenna arrangement comprising four antennas and two feeders each antenna

arrangement comprising a respective single feeder thus providing 4-way diversity with two feeder (Fig.3, page 3, lines 1-31, Fig.2, page 2, lines 15-26).

With respect to claim 30, MALMGREN discloses A frequency converter unit for use with at least one feeder on which a plurality of signals at mutually different frequencies are transported on a single feeder, characterized by a corresponding plurality of frequency converters (55-58) for converting the signals into a corresponding number of signals all at the same frequency (RXI) (Fig.3, page 3, lines 1-31).

With respect to claim 31, MALMGREN discloses a radio base station (Fig.3) comprising:

A transceiver with a plurality of frequency converters adapted to provide frequency translated signals called diversity signals all at the same frequency (Fig.3, page 3, lines 1-31, Fig.2, page 17-40)

means for signal processing (filter splitter/combiner) the diversity signals in order to obtain an enhanced signal (Fig.3, page 3, lines 1-31), comprising means connected to the input of the transceiver to receive from one single feeder at least one intermediate frequency signal (IF) together with either a non-frequency translated antenna signal and/or other frequency converted IF signals, and to supply said latter signals to respective ones of said frequency converters so as to provide said diversity signals (Fig.3, page 3, lines 1-31, Fig.2, page 2, lines 15-26).

With respect to claim 32, MALMGREN discloses A site comprising a radio base station (RBS), at least one tower-mounted unit (TMA) with filters and RF amplifiers, at least two antennas for providing diversity (Fig.3, page 3, lines 1-31, page 2, lines 15-26, Fig.2) [the mast top equipment is the TMA], the signals received by the antennas being RF signals which all are of the same frequency characterized by at least one frequency converter provided in the TMA and connected to one of the diversity antennas in order to convert the antenna's RF signal into an IF signal at a non-used frequency, and a combiner combining the IF signal with either a non-converted RF antenna signal and/or other converted IF signals into a composite signal which is applied to a single feeder extending between the TMA and the RBS (Fig.3, page 3, lines 1-31, Fig.2, page 2, lines 15-26).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amar Daglawi whose telephone number is 571-270-1221. The examiner can normally be reached on Monday- Friday (7:30 AM- 5:00 AM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lana N. Le can be reached on 571-272-7891. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

10-01-07

LANA LE
PRIMARY EXAMINER

Amar Daglawi